

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Inventor(s): Laura Wills Mirkarimi Confirmation No.: 1183
Application No.: 10/765,647 Examiner: Duy Vu Nguyen Deo
Filed: January 26, 2004 Group Art Unit: 1765
Title: METHOD FOR ETCHING HIGH ASPECT RATIO FEATURES IN III-V BASED
COMPOUNDS FOR OPTOELECTRONIC DEVICES

Attorney Docket No.: 10030753-1

Commissioner for Patents
P.O. Box 1450
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RESPONSE TO NOTICE OF NON-COMPLIANT BRIEF ON APPEAL

Sir:

This is in response to the Notification of non-Compliant Appeal Brief mailed June 24, 2008, for the referenced United States Patent Application.

In the Notification, check-boxes 4 and 10 are marked, with appropriate comments to the effect that the Summary of Claimed Subject Matter, pursuant to 37 C.F.R. §41.37(c)(1)(v), did not contain the required specification and drawing citations for the elements of the independent claims 1 and 12. Applicant's attorney regrets the non-compliance, and thanks the USPTO for pointing it out.

The Notification further states that only the correction to the non-compliant section, not the complete appeal brief, need be provided in response thereto. Accordingly, only the above-mentioned section of the Appeal Brief is provided below.

Applicant's Attorney respectfully submits that, with the present Response, the Appeal Brief as a whole is complete and ready for consideration by the Board of Appeals.

SUMMARY OF CLAIMED SUBJECT MATTER

Pursuant to 37 C.F.R. §41.37(c)(1)(v), the claimed invention is directed to a method for combining Reactive Ion Etching (RIE) with bromine based chemistry to etch III-V based compounds such as InP. Mixtures of HBr with CH₄ and H₂ provide fast etch rates, vertical sidewalls and good control over the growth of polymers that arise from the presence of CH₄ in the mixture. In accordance with the invention, HI or IBr or some combination of group VII gaseous species (Br, F, I) may be substituted for HBr. Typical values in accordance with the invention for mixtures of HBr, CH₄ and H₂ are HBr in the range of about 2 to 75 percent, CH₄ in the range of about 5 to 50 percent and H₂ in the range of about 5 to 40 percent by volume at pressures in the range from about 1 to 30 mTorr.

A method for etching high aspect ratio features in III-V based compounds for optoelectronic devices in accordance with the invention is described starting on page 3, line 1 of the specification, shown in FIGs. 1a-c. The method as recited in Claim 1 for etching a III-V semiconductor material (110) comprises placing a semiconductor substrate (105) on which the III-V semiconductor material (110) has been deposited into a reactive ion etching reactor (205); introducing a first gas chosen from HBr, HI and IBr into the reactive ion etching reactor (205), introducing a second gas of CH₄ into the reactive ion etching reactor (205), introducing a third gas of H₂ and exposing a portion of the III-V semiconductor material (110) to be etched to a mixture comprising the first, the second and the third gas.

The following is a statement of independent claims 1 and 12, with embedded references to specification page and line numbers, and to drawing figure and element numbers, which provide description of the respective claimed elements:

1. A method for etching [page 2, line 4] a III-V semiconductor material [page 3, line 5] comprising:

placing [page 3, line 23] a semiconductor substrate [FIGs. 1a, 1b, 1c:105] on which said III-V semiconductor material [FIG. 1a, 1b, 1c:110] has been deposited into a reactive ion etching reactor [FIG. 2:205];

introducing a first gas chosen [page 4, lines 21-22] from HBr, HI and IBr into said reactive ion etching reactor;

introducing [page 4, lines 6-10] a second gas of CH₄ into said reactive ion etching reactor;

introducing [page 5, lines 15-25] a third gas of H₂; and

exposing [page 6, lines 3-18] a portion of said III-V semiconductor material to be etched to a mixture [page 5, line 21] comprising said first, said second and said third gas [page 6, lines 5-10].

12. A method for etching [page 2, line 4] a III-V semiconductor substrate [page 3, line 6] comprising:

placing [page 3, line 23] said semiconductor substrate [FIGs. 1a, 1b, 1c:105] into a reactive ion etching reactor [FIG. 2:205];

introducing a first gas chosen [page 4, lines 21-22] from HBr, HI and IBr into said reactive ion etching reactor;

introducing [page 4, lines 6-10] a second gas of CH₄ into said reactive ion etching reactor;

introducing [page 5, lines 15-25] a third gas of H₂; and

exposing [page 6, lines 3-18] a portion of said III-V semiconductor substrate to be etched to a mixture [page 5, line 21] comprising said first, said second and said third gas [page 6, lines 5-10].

CONCLUSION AND PRAYER FOR RELIEF

For at least the reasons set forth in the remainder of Applicant's Appeal Brief, including the present revised Statement of Claimed Subject Matter, Applicants respectfully submit that the rejection of claims 1 and 12 under 35 U.S.C. § 103 is improper and that claims 1 and 12 are patentable over the applied art. Moreover, and for at least the same reasons, the rejections of claims 2-11 and 13-20, which depend from claims 1 and 12, respectively, are also improper and these claims are patentable for at least the same reasons.

It is respectfully requested that the Board of Patent Appeals and Interferences reverse the Examiner's final rejection of Claims 1-20 so that this case may be allowed and pass to issue in a timely manner.

Respectfully submitted,

/James C. Pintner/

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